

There is a clear need to prevent the transport of non-native species in ballast water. Therefore taking no action (Alternative 3) would lead to further environmental and economic problems and is simply not acceptable. Although the release of no living organisms larger than 0.1 micro would completely eliminate the risk of invasions via ballast water, complete sterilization (Alternative 1) is not feasible technologically or economically. I feel strongly that Alternative 2 which establishes maximum acceptable discharge concentrations for various types or size classes of organisms make the most sense. It is feasible and can remove nearly all risk of invasions through ballast water, making it an insignificant potential source of aquatic invasions when compared to other vectors such as hull fouling and aquaculture.

While I feel that Alternative 2 is the best option, there are several issues that must be addressed for a concentration based standard like this to be successful.

1) The term "viable" must be carefully and explicitly defined. Does it mean 1) simply living, 2) capable of survival in receiving waters, 3) capable of reproduction either physiologically or ecologically (e.g., availability of conspecifics for sexual reproduction) in receiving waters, or 4) capable of establishing a sustained population in receiving waters?

2) To significantly reduce the risk of invasions the number of viable organisms per unit volume of water released into the environment must be very low. However the volumes of water transported in ballast tanks can be enormous. It will therefore be critical to develop indirect measures to evaluate ballast waters for compliance with regulations and to determine if ballast water treatments are operating appropriately and effectively.

3) The concentrations selected for the standard under Alternative 2 should be based on sound scientific information for what levels would eliminate or greatly reduce the risk of invasions and not simply selecting numbers that are two or three orders of magnitude lower than what currently arrives in ballast tanks. While some of the information required may not currently exist, models are being developed which can help in this processes.

4) The issue of microbes, in particular pathogens, will also require careful thought. My main concern is with using culturable units of indicator species such as *Vibrio cholera* and *Escherichia coli*. The presence or abundances of these organisms does not necessarily tell you anything about the composition of the potential invasive microbes in the ballast water. Furthermore, these species are ubiquitous and can often be found in such high concentrations in heavily impacted coastal waters (such as harbors) that standards may require the release of ballast water that actually has a much low concentration of the indicators than the receiving waters.